SYSTEM-SCALE HYDROPOWER PLANNING
FOR THE
INDUS BASIN, PAKISTAN

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Government of Pakistan - Ministry of Water and Power
Project Management and Policy Implementation Unit
Water Sector Capacity Building and Advisory Services Project
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FLOODS
Flash and urban floods ravaged north-eastern Pakistan and western India when late and concentrated monsoon rains started on 4 September. As of 2 October, the floods caused 364 deaths and affected approximately 2.5 million people in Pakistan. In addition to the loss of life and injury, there has been a social and economic cost: the partial and total loss of homes, significant loss of livestock and livelihoods and massive crop damage. Authorities set up 527 relief camps in affected areas to provide immediate health care services, referrals, cooked food, water, and non-food items, such as tents, blankets, soap, and sleeping mats.

KEY STATISTICS
- 2.53 million people affected
- 107,000 houses damaged
- 2.4 million acres crops affected
- 527 Relief camps

FLOOD HISTORY IN PUNJAB
Recurrent monsoon floods over the last four years have affected more than 8 million people, many of them multiple times, leaving them vulnerable and in need of early recovery assistance.

Number of affected people

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
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<td>5</td>
<td>4</td>
<td>3</td>
<td>2</td>
<td>1</td>
</tr>
</tbody>
</table>

Area of affected crop land

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2.5</td>
<td>2.0</td>
<td>1.5</td>
<td>1.0</td>
<td>0.5</td>
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</tbody>
</table>

Number of damaged houses

<table>
<thead>
<tr>
<th>Year</th>
<th>2010</th>
<th>2011</th>
<th>2012</th>
<th>2013</th>
<th>2014</th>
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<tr>
<td></td>
<td>400</td>
<td>300</td>
<td>200</td>
<td>100</td>
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</table>

The boundaries and names shown and the designations used on this map do not imply official endorsement or acceptance by the United Nations. Uotted line represents approximately the Line of Control in Jammu and Kashmir agreed upon by India and Pakistan. The final status of Jammu and Kashmir has not yet been agreed upon by the parties.
STRATEGIC SECTORAL ENVIRONMENTAL AND SOCIAL ASSESSMENT (SSESA) OF THE HYDROPOWER SECTOR IN THE INDUS BASIN

• In 2008, the Water and Power Development Authority (WADPA) announces "Vision 2025"

• Develop 80 billion cubic metres of water storage and add 37,770 megawatts of hydropower generation capacity by 2025

• Cost of implementation US$ 32.15 billion*

Challenge: Develop the program while meeting expectations to incorporate sustainability and social equity in a highly degraded system.

(*up to $90 billion including privately funded projects)
WHAT is SSESA?
METHODS

• A team of local and international technical specialists with expertise in the legal, planning, engineering, design, environmental and social disciplines

• Reviewed components of the existing HPP planning and development process, including:
  o institutional frameworks
  o policies
  o environmental and social resources of the Indus Basin
  o planning frameworks for hydropower development
  o cumulative impacts

• Extensive stakeholder consultation
FINDINGS

Policy

• Hydropower policy is in draft form
• Lack environmental/social provisions in laws/policies

Capacity Building

• Required in the areas of:
  o strategic policy formulation
  o project assessment

Compensation and Resettlement

• Not considered to be a high priority
• Past projects have stalled due to unresolved disputes
FINDINGS

Baseline Data

• Significant gaps exist in the existing dataset
• Lack of central database not conducive with informed decision making

Financial

• Losses of ecosystem services, climate change impacts/adaptation not considered
• Tendencies for funding disputes to delay projects
**FINDINGS**

*Climate Change*

- Hydropower is vulnerable due to reliance on water availability and security.
- North Pakistan very susceptible to climate change impacts as it is influenced by three major weather systems:
  - sub-Mediterranean regime of mainly winter, westerly storms;
  - the Indian summer monsoon; and
  - the Tibetan anticyclone (Huntington, 2006)

*Intensity of catastrophic events is predicted to increase*
CONCLUSIONS

Environmental and Social Impacts

• Main cumulative impacts land loss and disruption of environmental flows
• Cumulative impacts best addressed a system-scale
RECOMMENDATIONS

• Hydropower Program Optimisation (policy, targets, timeframes)
• Long Range Planning of Projects (interim water and power targets)
• System Level Strategies for Cumulative Impacts
PROGRAM OPTIMISATION
LONG RANGE HPP PLANNING

YEARS 1-5
INTERIM TARGETS
28,800 MW
9 BCM

YEARS 6-10
INTERIM TARGETS
39,100 MW
13 BCM

YEARS 11-15
INTERIM TARGETS
57,400 MW
17 BCM

YEARS 16-20
FINAL TARGETS
83,600 MW
21 BCM

PROJECTS:
- TARBELA (RoR)
- MOHMAND DAM (Multipurpose)
- NEELUM JHELUM (RoR)
- KOHALA (RoR)
- KAROT (RoR)
- DIAMER BHASHA (Multipurpose)
- DASU (RoR)
- BUNJI (RoR)
- PATTAN (RoR)
- SHYOK (Multipurpose)
- THAKOT (RoR)

Flow and Adaptive Flow Technology
SYSTEM LEVEL STRATEGIES FOR CUMULATIVE IMPACTS
SYSTEM LEVEL STRATEGIES FOR CUMULATIVE IMPACTS

Frameworks, Policies, Plans and Programs

1. NATIONAL WATER AND POWER STRATEGY
   - Generation and Storage Targets
     - Power Generation Targets
     - Water Storage Requirements
     - Hydropower Contribution
   - Hydropower Development Programme
     - Targets
     - Projects
     - Locations
     - Funding
     - Scheduling
     - Supporting Infrastructure

2. IWRM STRATEGY
   - Telemetry System
   - Flood Management Plan
   - Catchment Management Plan
   - Climate Change Adaptation Plan

3. REGIONAL BIODIVERSITY CONSERVATION STRATEGY
   - Biodiversity Offsets Plans
   - Aquatic Resources Management Plans
   - Data Collection Programme
   - Central Database
   - Project Level Mitigation Guidelines
   - Transport Management Plan

4. REGIONAL RESETTLEMENT AND COMPENSATION STRATEGY
   - Public Consultation Program
   - Land Acquisition and Compensation Guidelines
   - Social Infrastructure Plans
   - Heritage Conservation Plans
   - Economic Development Plans
   - Local Employment Guidelines
   - Grievance Redress Mechanism Guidelines

5. POLICY AND IMPLEMENTATION REFORM STRATEGY
   - GoP Policy for HPP
   - Policy Reform Plan
   - Capacity Building Programme
   - Sectoral Guidelines for HPP Development

Stakeholder Engagement and Communications Strategies